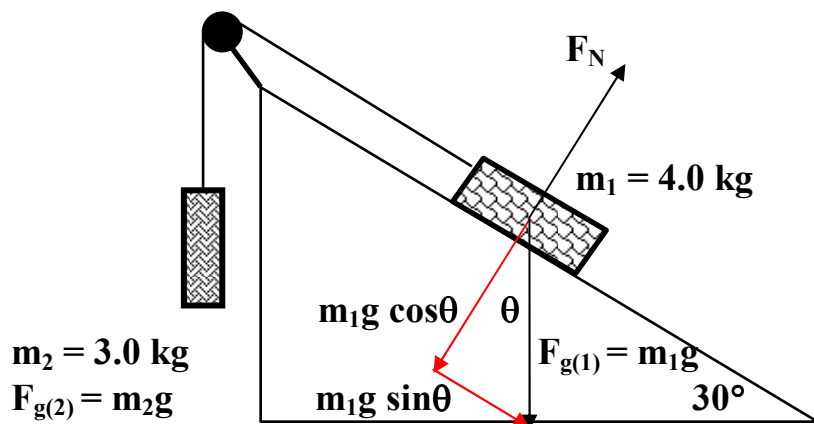


Example #17. In the diagram below, a 4.0 kg mass rests on a 30° frictionless slope and is pulled by a 3.0 kg mass connected to it over a pulley by a cord. What is the acceleration of the system and the tension in the cord?



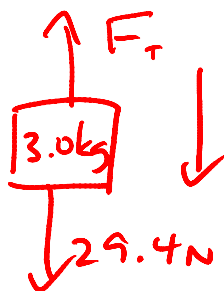
$$\begin{array}{ccc} \leftarrow & \boxed{m_T = 7.0 \text{ kg}} & \rightarrow \\ m_2 g = 3(9.8) & & m_1 g \sin \theta = 4(9.8) \sin 30^\circ \\ = 29.4 \text{ N} & & = 19.6 \text{ N} \end{array}$$

$$F_{\text{net}} = 29.4 - 19.6 = 9.8 \text{ N}$$

$$F_{\text{net}} = m_T a \quad 9.8 = 7.0 a \quad \boxed{a = 1.4 \text{ m/s}^2}$$

(up slope)

→ f.b.d. of hanging mass



$$a = 1.4 \text{ m/s}^2 \Rightarrow F_{\text{net}} = 3(1.4) = 4.2 \text{ N}$$

$$\rightarrow 29.4 > F_T, \text{ so } F_{\text{net}} = 29.4 - F_T$$

$$F_T = 29.4 - 4.2 \quad \boxed{F_T = 25 \text{ N}}$$